of the movement. This explanation should be clear from the specification.

Paragraph 8, The 'jetting means' has been replaced with 'means for jetting'.

Paragraph 8, line 4 has been corrected.

Paragraph 8, claim 6, lines 1, 2 and 6 have been corrected.

Paragraph 8, claim 7, lines 1 and 5 have been corrected.

Paragraph 8, claim 9, it is unclear as to what constitutes 'roughly adjusting. the examiner's attention is directed to page 8, lines 12 and 13 for a complete explanation.

Paragraph 8, claim 10, line 1. It is unclear as to what constitutes 'finely' adjusting. The Examiner's attention is directed to the specification page 8, line 14 for a complete explanation.

Paragraph 8, claim 11. The amended claim now should make it clear that the cylindrical filter has an open end and a closed end.

Paragraphs 11, claims 11 and 13 - 15 have been amended to overcome the rejections under 35 U.S.C 112. It is believed that the rejections under this Paragraph have been overcome.

Art rejections

Claims 1, 2, 5 and 9 - 10 are rejected under 35 U.S.C. 103 as being unpatentable over Means, JR. in view of Grotto.

The Examiner's states: "Means discloses a similar filter cleaning apparatus however fails to disclose a rotating cup for supporting a filter. **This is Correct.**

Means discloses an enclosed cleaning chamber. **This is correct.**

Means discloses means within means within the chamber for rotatably supporting the filter. **this is correct.**

Grotto discloses a filter cleaning apparatus having a freely rotating cup and cone-shaped element for rotatably supporting a filter in a cleaning chamber. **Correct.**

It is now advanced to the examiner that Means does not clean an elongated

and cylindrical filter that has an open end and a closed end as is claimed. Therefore, the apparatus has to be quite different. Means does not show a freely rotating cup. Means shows a platform that rotates the cup. Further, Means does not show that the means for driving said cone shaped element and said means for jetting air are both located on the outside of the cleaning chamber as is claimed. Because of all of the above explained differences, the Means reference cannot be used as a base reference and then modified by a second reference as being 'obvious' because the first reference is faulty already. Grotto , when applied to Means does not cure the noted defects of Means. It is agreed that Grotto shows a cone shape as driving the filter in rotation but does not have a freely rotating cup. In fact this a platform and not a cup. The filter of Grotto is open on both ends. Therefore, the structure of Means cannot be modified by any of the elements of Grotto as is suggested by the Examiner. If done so, the structure of Means cannot function anymore as intended and that surely is not an indicia of obviousness

Paragraph 14. Claims 11 and 13 - 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grotto in view of McKay. The applicant agrees with the examiner of all what Grotto discloses. However Grotto does not disclose a cylindrical filter having one end closed and the other end open. The filter is not rotated by a cone-shaped element in the open end and a cup-shaped element at the closed end as is claimed by applicant. Therefore, even if Grotto is modified with McKay et al as suggested by the Examiner, the resulting structure is still different and not taught in the art.

In view of all of the above the examiner is respectfully requested to reconsider the rejection of all of the claims and allow the application

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chamber 1 that contains the filter to be cleaned and the instruments immediately involved in the cleaning process. The filter has been identified as F and has two ends. One end is open and the other end is closed. The closed end is identified as F1 and is received in a freely rotating cup 20 which will be explained in more detail in Fig. 2. The other end F2 is an open end and will be received on a cone-shaped driven element 39 which will be explained in more detail with reference to Fig. 3 below. As will be explained in the operation of the apparatus below, the chamber or cabinet 1 is under a negative pressure to suck off dust or dirt laden air through manifolds 3 into the bottom suction tube 2. As will be explained in more detail below, there is a filter cleaning assembly carrying two jets 7a and 7b. Also on the cleaning apparatus there is mounted a control panel 5 which controls the overall operation of the apparatus. Also Fig. 1 illustrates a positive pressure blower 6 which will be explained in more detail below with reference to other Figs. and in the operation of the apparatus. Fig. 1 also a shows brush system at 4 which isolates the exterior of the apparatus from the interior in that only an upper plate 41a passes through the brush system 4 as the upper plate 41a reciprocates back and forth, again, as will be explained below.

Turning now to Fig. 2 which shows the freely rotating cup 20 of Fig. 1 in more detail. The freely rotating cup 20 is supported on a freely turning plate 21 by way of screw threads 21a. The freely turning plate 21 is supported on a back-up plate 22 which can slide on support shafts 24. The back-up plate 22 is restrained in its movement by a second support plate 23 by way of air cylinder shafts or pistons 27a and 27b which are in a rigid connection with the first support plate 22. The second support plate 23 which can also on the support shafts 24. The second support plate 23 also carries a sleeve 35 having an arresting handle 35a thereon for the purpose of roughly adjusting a given length of a filter first within the chamber 1 and the freely

rotating cup 20 and to thereafter make a fine adjustment by way of the air cylinders 26a and 26b and the piston shafts 27a and 27b, respectively. The freely rotating cup 20 has an interior which has an inverted cone shape which will center the closed end F1 of the filter F to be cleaned once the air cylinders 26a and 26b make their fine adjustment.

Turning now to Fig, 3 which shows the open end F2 of the filter F and how the filter F is received on a cone-shaped element 39. The cone-shaped element 39 is rotatably supported on a second plate 31 which is supported within the cleaning chamber 1 and includes the support shafts 24. The cone-shaped element 39 is mounted on a tapered ring 32 that rides in grooved idler wheels 33 which are attached to the second support plate 31. The cone-shaped element 39 is rotated by way of a ring gear 32a which is attached to the tapered ring 32, making up the complete rotating assembly. The ring gear 32 itself is driven by an internal driving pinion 34 which is driven by a motor 38 mounted on the outside of the second support plate 31 which is outside of the cleaning chamber 1. When in operation, the inside of the filter F is under pressure which is supplied through the internal passage 37 of the cone-shaped element 39 by way of an air hose or duct 36.

Fig. 4 illustrates the inside and the outside of the cleaning chamber 1. The outside of the cleaning chamber shows a sliding carriage 41. The carriage 41 has two sliding elements 43 (only one is shown) which slide in guides 44 which are mounted rigid with the housing. Mounted on the carriage 41 is an electric motor 47 which has mounted on its drive shaft 47 a a pinion 46 which is in mesh with geared rack 45. An operation of the motor 47 traverses the carriage along the full length and on the outside cleaning chamber.

Other ways can be employed to affect the traversing of the cleaning chamber. In one embodiment a motor driven chain could be used to have the same moving effect. Such a chain drive could be a reciprocating chain or a continuously running chain

wherein the upper and lower runs alternatingly drive the carriage along. A different embodiment could involve a cable running on the same principle as was explained with the chain drive. However a rack and pinion drive is preferred because of its reliability.

Continuing now with Fig. 4, the inner cleaning chamber 1 is substantially sealed from the ambient atmosphere by way of two opposing brush elements 4. Extending through the brush elements 4 is an upper support plate 41a which on the other side of the brush elements 4 is supported at an upper end of the carriage 41 and therefore moves along with the carriage 4. The upper support plate 41a has a parallelogram type element supported therefrom which in turn supports a lower support plate 41b. The four arms of the parallelogram are indicated at 42. The lower support plate 41b has depending therefrom two air jets 7a and 7b which are oriented toward the filter F in opposite directions. The purpose of the parallelogram is to keep the air jets precisely at dead top center at the filters to be cleaned when different diameter filters are being used. The adjustment to a different size filter can simply be accomplished by using a ball and chain 49 with its upper end fastened to the upper support plate 41a and the lower end adjustably fastened to the lower support plate 41b which has a forwardly opening slot 50 therein. When, for example, the lower support plate 41b has to be raised because of a larger diameter filter to be cleaned, the ball chain 49 is slid out of the slot 50 on the lower support plate 41b and the next higher ball or balls are re-engaged within the slot 50 and the air jets are now supported at a higher elevation with remaining dead center of the outer periphery of the filter. It is again reiterated that the forward part of Fig. 4 including the filter cleaning are located within the completely enclosed chamber 1 and that this enclosed chamber is under negative air pressure.

Turning now to Fig. 5 which shows a side view of the cleaning apparatus. Like reference characters have been used to identify the same elements as were us

described in previous Figs. The filter F is identified as being pleated and the depending supporting parallelogram type device of Fig. 4 has been changed to a simplified support element. To this end, the upper support plate 41a has now depending therefrom at a downward slant two plates 52 and 53 which are adjustable relative to each other so as to change their length by way of a bolt 64 passing through both plates and a wing nut 55 to keep the plates 52 and 53 in adjusted position depending upon the outer diameter [if] of the filter F.

Operation of the Apparatus

Depending on the length of the filter, a filter F with its closed end is first placed into the receiving cup 20 and a rough adjustment relative to the receiving cone 39 at the other end of the apparatus is made by way of the rough length adjustment 35a and 35b. The control panel 5 will now give signals to activate the air cylinders 26a and 26b to properly seat the filter F with its open end on the cone 39. As a next step, either the parallelogram type device is properly adjusted by using the ball chain 49 in its correct location to achieve a correct distance of the air jets 7a and 7b from the outer circumference of the filter, or, as a different embodiment as shown in Fig. 5, the plates 52 and 53 are adjusted relative to each other by way of the wing nut 55, again to obtain the correct distance of the air jet 7 relative to the outer circumference of the filter.

As a net step, the interior of the cleaning 1 is set under a negative pressure by way of the suction tube 2 and the interior of the filter is set under positive pressure by way of the pressure of the pressure hose 36. Al filters of this type to be cleaned are always dirty on the outside.

As a next step, the motor 38 is activated for the rotation of the filter F. This may be in the form of a continuous rotation or incremental rotation depending on how soiled the filter is and what other material has been collected on the filter.

Next, the lateral movement of the air jets is activated by way of the electric motor 47. The lateral movement may be a continuous sweep back and forth across the filter F or it may be performed in a stepwise motion again depending on how soiled the filter is and again what other material has been collected on the filter. In a stepwise motion the air jets have a chance to momentarily dwell on any particular spot. The air jets are now activated and the operation begins all depending on the settings of the control panel 5.

It should be noted that in Fig. 4 that the air jets 7a and 7b are slanted downwardly but in opposite directions. In this manner, the air jets have a chance to direct their streams downwardly but in a slanted mode to dig the dirt out of the pleats rather than blowing directly on top of the dirt. At the same time it should be noted that the internal air pressure within the filter prevents any dirt or dust from being pushed through the filter medium into the interior of the filter.

What We claim is: